

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 03 MAY 2001

WIPO PCT

14

Applicant's or agent's file reference 7024477P117	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US00/19325	International filing date (day/month/year) 17 JULY 2000	Priority date (day/month/year) 16 JULY 1999
International Patent Classification (IPC) or national classification and IPC IPC(7): G01B 09/02 and US Cl.: 356/451		
Applicant PURDUE RESEARCH FOUNDATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This **REPORT** consists of a total of 3 sheets.
☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
 These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:
 - I ☒ Basis of the report
 - II ☐ Priority
 - III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 15 FEBRUARY 2001	Date of completion of this report 27 MARCH 2001
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer <div style="text-align: center;"> FRANK FONT </div>
Facsimile No. (703) 305-3230	Telephone No. (703) 308-0956

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US00/19325

I. Basis of the report

1. With regard to the elements of the international application:*

☐ the international application as originally filed☒ the description:

pages 1-24, as originally filed

pages NONE, filed with the demand

pages NONE, filed with the letter of

☒ the claims:

pages NONE, as originally filed

pages NONE, as amended (together with any statement) under Article 19

pages 25/1-25/5, filed with the demand

pages NONE, filed with the letter of

☒ the drawings:

pages 1-16, as originally filed

pages NONE, filed with the demand

pages NONE, filed with the letter of

☒ the sequence listing part of the description:

pages NONE, as originally filed

pages NONE, filed with the demand

pages NONE, filed with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).☐ the language of publication of the international application (under Rule 48.3(b)).☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in printed form.☐ filed together with the international application in computer readable form.☐ furnished subsequently to this Authority in written form.☐ furnished subsequently to this Authority in computer readable form.☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4. ☒ The amendments have resulted in the cancellation of:☒ the description, pages NONE☒ the claims, Nos. 1☒ the drawings, sheets/fig NONE5. ☐ This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

**Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US00/19325

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. statement**

Novelty (N)	Claims <u>2-26</u>	YES
	Claims <u>NONE</u>	NO
Inventive Step (IS)	Claims <u>2-26</u>	YES
	Claims <u>NONE</u>	NO
Industrial Applicability (IA)	Claims <u>2-26</u>	YES
	Claims <u>NONE</u>	NO

2. citations and explanations (Rule 70.7)

Claims 2-26 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest a method for infrared spectral imaging of a sample using a spectrometer and a sensor, comprising the steps of a) selecting a scanning speed of the spectrometer; b) causing the spectrometer to scan the sample with infrared light; c) triggering the detector to measure the absorption of light by the sample upon starting the scan; and d) repeating steps (b)-(c) a predetermined number of times.

----- NEW CITATIONS -----
NONE

What is claimed:

2. A method for infrared spectral imaging of a sample using a spectrometer and a sensor, comprising the steps of:

- 5 a) selecting a scanning speed of the spectrometer;
- b) causing the spectrometer to scan the sample with infrared light;
- c) triggering the detector to measure absorption of light by the sample upon starting the scan; and
- d) repeating steps (b)-(c) a predetermined number of times.

10 3. The method of claim 2 wherein the sample comprises a combinatorial library.

4. The method of claim 3 further comprising forming the combinatorial library with discrete quantities of a plurality of different samples.

15 5. The method of claim 3 wherein the sensor comprises a focal plane array.

6. The method of claim 5 wherein the spectrometer includes an interferometer.

7. The method of claim 6 wherein the spectrometer includes optical lenses suitable for use in the IR spectral range.

20 8. The method of claim 7 wherein the combinatorial library is transparent to infrared radiation.

9. The method of claim 7 wherein the combinatorial library is in contact with a substrate reflective of infrared light.

25 10. The method of claim 7 wherein the sample is in contact with an infrared transparent prism with a refractive index higher than the sample.

11. The method of claim 7 wherein the lenses comprise material selected from the group consisting of calcium flouride (CaF_2), zinc selenide (ZnSe), and germanium (Ge).

5 12. A method for evaluating a plurality of different samples comprising:
forming a library of discrete quantities of the plurality of different samples,
placing the library in the sample chamber of a spectrometer, the spectrometer comprising a source of infrared light, an interferometer, and a focal plane array,
10 selecting a scanning speed of the spectrometer,
causing the spectrometer to scan the library with infrared light at predetermined time intervals,
detecting the infrared light absorbed by the library with the focal plane array at the predetermined time intervals,
15 wherein spatially resolved time series of absorbance spectra of the library are determined.

13. The method of claim 12 wherein:
the spectrometer comprises focusing and condensing optics comprising at least one lens suitable for use in the IR spectral range.

20 14. The method of claim 12 further comprising:
exposing the library to controlled conditions while illuminating the library with infrared light to evaluate the plurality of samples under the controlled conditions.

25 15. The method of claim 14 further comprising:
assigning one or more time series of absorbance spectra to each of the different samples of the library,
evaluating the different samples based on the assigned absorbance spectra.

16. The method of claim 12 wherein the at least one lens comprises material selected from the group consisting of calcium flouride (CaF_2), zinc selenide (ZnSe), and germanium (Ge).

5 17. A method for evaluating a plurality of different samples comprising:
 forming a library of discrete quantities of the plurality of different samples,
 exposing the library to controlled conditions,
 obtaining time series of absorbance spectra of the samples in the library
 while exposing the library to the controlled conditions by:

10 (a) causing a spectrometer to illuminate the library with infrared light at a constant scanning speed, the spectrometer comprising a source of infrared light, an interferometer, focusing optics, condensing optics, and a focal plane array,

15 (b) detecting the infrared light absorbed by the library with the focal plane array

(c) determining absorbance spectra for each of the samples in the library from the detected infrared light

(d) repeating (a) through (c) a predetermined number of times.

20 18. The method of claim 17 wherein:
 the focusing and condensing optics comprise at least one lens suitable for use in the IR spectral range.

19. The method of claim 18 wherein the at least one lens comprises materials selected from the group consisting of calcium flouride (CaF_2), zinc selenide (ZnSe), and germanium (Ge).

25 20. The method of claim 19 further comprising:
 selecting a desired spectral region,
 employing a filter to only allow light from the selected spectral region to be collected.

21. A method for infrared spectral imaging of a combinatorial library using a spectrometer and a detector, comprising:

selecting a scanning speed of the spectrometer, the spectrometer having an interferometer comprising at least one moveable mirror, the scanning speed
5 selected by selecting a speed of the mirror,

causing the spectrometer to illuminate the combinatorial library with mid-infrared light,

triggering the detector to measure absorption of light by discrete samples of the combinatorial library upon starting the scan,

10 repeating steps (b)-(c) a predetermined number of times.

22. The method of claim 21 wherein the spectrometer includes condensing optics to focus the mid-infrared light on the detector, the detector comprising a focal plane array.

23. A method for infrared spectral imaging of a
15 combinatorial library using a spectrometer and a detector, comprising the steps of:

- a) selecting a first retardation of the spectrometer;
- b) illuminating the sample with infrared light emitted by the spectrometer;
- 20 c) sending a trigger signal from the spectrometer to the detector, thereby causing recording of a data set by the detector;
- d) selecting another retardation of the spectrometer after recording a single data set;
- 25 e) repeating steps (b)-(d) until a predetermined number of retardations have been selected; and
- f) repeating steps (a)-(e) until a predetermined number of interferograms of the sample have been collected.

24. The method of claim 23 wherein the spectrometer includes condensing optics to focus the infrared light on the detector, the detector comprising a focal plane array.

5 25. The method of claim 24 wherein the spectrometer includes optical lenses suitable for use in the IR spectral range.

26. The method of claim 25 wherein the lenses comprise material selected from the group consisting of calcium flouride (CaF_2), zinc selenide (ZnSe), and germanium (Ge).